Instructions: Try these problems from the textbook as practice (answers below).

Problems

3-10. Compute an equation of the tangent plane to the given surface at the specified point.

3. $z = 2x^2 + y^2 - 5y$ at $(1, 2, -4)$
5. $z = e^{x-y}$ at $(2, 2, 1)$
9. $z = x\sin(x + y)$ at $(-1, 1, 0)$

15-22. Explain why $f(x, y)$ is differentiable at P; compute the linearization $L(x, y)$ of f at P.

15. $f(x, y) = x^3y^2$ at $P = (-2, 1)$
17. $f(x, y) = 1 + x\ln(xy - 5)$ at $P = (2, 3)$
19. $f(x, y) = x^2e^y$ at $P = (1, 0)$
21. $f(x, y) = 4\arctan(xy)$ at $P = (1, 1)$

27. Approximate $\sqrt{(3.02)^2 + (1.97)^2 + (5.99)^2}$ using a linearization.

Answers

3. $z + 4 = 4(x - 1) - (y - 2)$
5. $z - 1 = (x - 2) - (y - 2)$
9. $z = x + y$
15. $L(x, y) = -8 + 12(x + 2) - 16(y - 1)$
17. $L(x, y) = 1 + 6(x - 2) + 4(y - 3)$
19. $L(x, y) = 1 + 2(x - 1) + (y - 0)$
21. $L(x, y) = \frac{\pi}{4} + 2(x - 1) + 2(y - 1)$
27. **Hint**: Linearly approximate $f(x, y, z) = \sqrt{x^2 + y^2 + z^2}$ at $(3, 2, 6)$.